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A collection of fishes from the Jardine River, Cape York Peninsula, Australia

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Abstract

Collections of freshwater fishes were obtained by the authors from the Jardine River at the northern tip of Cape York Peninsula on two expeditions during 1978 and 1979. An annotated checklist is presented which includes 30 species belonging to 24 genera and 16 families. The fish fauna of the Jardine River is most similar to that of the central coastal plain of southern New Guinea; at least 63% of the Jardine River fishes occur in the latter region. In addition, a similarity exists between the fish faunas of the Jardine River and Arnhem Land, Northern Territory. The zoogeographic relationships of these faunas are discussed in detail.

Introduction

The long neglected freshwater fish fauna of Australia, comprised of approximately 180 species, has commanded considerable attention from taxonomists during the past decade and as a result most major groups have been studied or are currently being reviewed. Important revisions include those of Nelson and Rothman (1973) on the Dorosomatinae, Vari (1977) on the Teraponidae, Ivantsoff (1978) on the Atherinidae, Allen (1978) on the Toxotidae, McDowall and Frankenberg (in press) on the Galaxiidae, and Thomson (in press) on the Mugilidae. In addition, the freshwater fish fauna was partially summarised by Lake (1971 and 1972) and various authors are now revising the Ambassidae, Eleotridae, Melanotaeniidae, and Plotosidae. However, in spite of this attention there still remains a need for collections from certain areas which are critical when attempting to define the distributions of various species. One such area is the remote northern tip of Cape York Peninsula, particularly the Jardine River which represents the northernmost large watercourse in Australia. During September 1978 Mr. Roger Steene and the senior author made a series of fish collections and underwater observations on the Cape York Peninsula including 2 stations at the Jardine River (see Fig 1). One year later the authors made a second series of collections at this locality. These represent the first comprehensive collections from this area. The 1978-79 collections and supplementary visual records include 30 species which represents the largest number of fishes from a single site in Australian freshwater. These collections are reported below together with a small number of fishes taken at the Jardine River by Graham Webb of Sydney University during a crocodile survey in 1972.

Methods

Fish specimens were obtained by the use of a small seine and also with dipnets after being stricken with rotenone. Most specimens were obtained in a small unnamed tributary of the Jardine River from where the stream entered the main river to a point about 400 m upstream. In addition, several species were recorded on the basis of sight records obtained while swimming with a face mask in the main river. The collections were made about 25-30 km upstream from the sea and the main Jardine River was exceptionally clear and flowing at this point with a width of approximately 100 metres. The collection data were as follows:

J-1.—Small tributary of Jardine River in vicinity of wooden bridge on Cape York road about 1 km SW of Jardine Crossing (approximately 11°10'S, 142°22'E); small shrimp seine over sand and mud bottom with aquatic vegetation to depths of 0.3 m; water fresh and clear with pH 5.5 and temperature 30°C; G. Allen on 20 September 1978.

J-2.—Same tributary as above, but deep (approximately 5 m) pool about 4 x 20 m adjacent to main Jardine River channel; rotenone and dipnets; water fresh and clear with pH 5.5 and temperature 29°C; G. Allen and R. Steene on 21 September 1978.

J-3.—Same tributary as above from main river to point approximately 400 m upstream; rotenone and dipnets at depths ranging to about 3-5 m; water fresh and clear with pH 5.4 and temperature 25.2-27.5° C; G. Allen and D. Hoese on 29 August 1979.

J-4.—Jardine River, about 4 km upstream from Cape York Road crossing, swampy area under overhanging paper-bark trees along edge of river; small shrimp seine over sand and mud bottom with aquatic vegetation; water fresh and clear with pH 5.8 and temperature 28.5°C; D. Hoese on 30 August 1979.

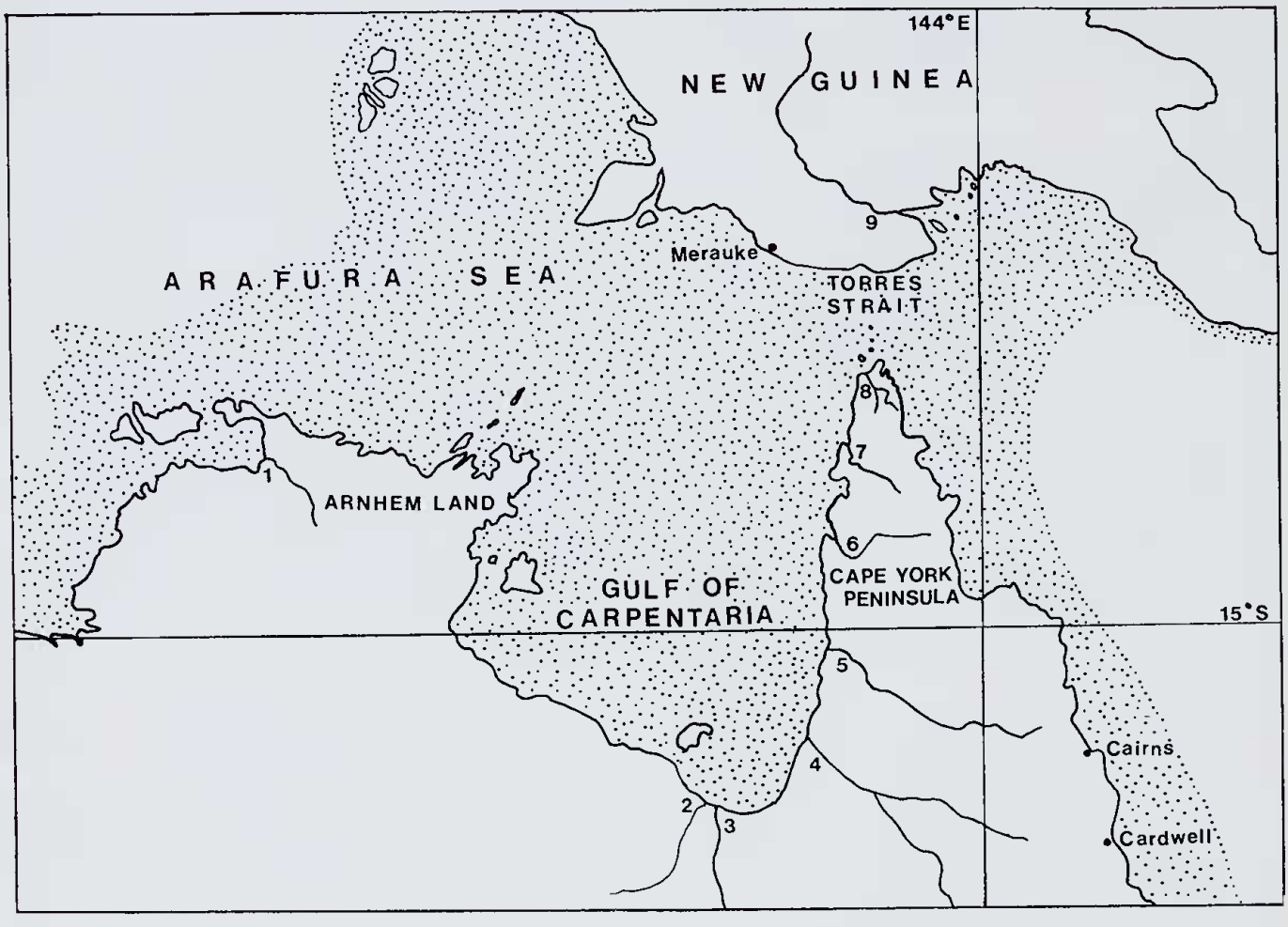

Figure 1.—Map of northern Australia and south-central New Guinea. The stippled area represents the emergent land of the Pleistocene at approximately 20 000-14 000 years B.P. Numbers refer to rivers which are mentioned in the text: 1, East Alligator River; 2, Gregory River; 3, Leichardt River; 4, Gilbert River; 5, Mitchell River; 6, Archer River; 7, Wenlock River; 8, Jardine River; 9, Fly River.

J-5.—Packsaddle Creek, at junction with Jardine River about 3 km upstream from Cape York Road crossing; rotenone and dipnets along mud bank among aquatic vegetation; water fresh and clear with pH 5.2 and temperature 28.5°C; G. Allen and D. Hoese on 30 August 1979.

J-6.—Lily pond adjacent to J-5, approximately 10 x 25 m with depths to 1.8 m; rotenone and dipnets among aquatic vegetation on soft mud bottom; water fresh and clear with pH 5.2 and temperature 28.5°C; G. Allen and D. Hoese on 30 August 1979.

J-7.—Lily pond adjacent to J-1 tributary; small shrimp seine over mud bottom with aquatic vegetation; water fresh and clear; D. Hoese on 31 August 1979.

GW-1.—Small lagoon 200 m off Jardine River, drum nets over mud bottom to depths of 0.6-1.5 m; G. Webb in September 1972.

B-1.—Bridge Creek, tributary of Jardine River at crossing on Cape York Road approximately 8 km south of Jardine River, collection made in small tributary of Bridge Creek in swampy area; rotenone and small shrimp seine over sand and mud bottom with aquatic vegetation; water fresh and clear with pH 5.2 and temperature 29.3°C; G. Allen and D. Hoese on 28 August and 1 September 1979.

Results

A total of 30 species belonging to 24 genera and 16 families was recorded. An annotated list of the species is presented below. Abbreviated literature citations are given for original descriptions, which include the author, year of publication, page or plate number, and locality. This information is followed by a list of the material collected and general remarks. Specimens are deposited at the Australian Museum, Sydney (AMS) and the Western Australian Museum, Perth (WAM). In addition to the specimens listed below representative collections of most species have been lodged at the Australian Museum and Queensland Museum, Brisbane.

Annotated list of species

Family Megalopidae—Oxeye Herrings

Megalops cyprinoides (Broussonet)

Clupea cyprinoides Broussonet, 1782: plate ix (Jamaica, Antigua, Brazil, and New Hebrides).

J-3 (WAM P26717-006), 1 specimen, 148 mm SL. In addition, several individuals were observed by the senior author in 1978 while swimming with a face mask in the main river channel. Circumtropical distribution, occurring in the sea and estuaries, but frequently entering freshwater.

Family Anguillidae—Freshwater Eels

Anguilla reinhardti Steindachner

Anguilla reinhardti Steindachner, 1867: 15 (Fitzroy River at Rockhampton, Queensland).

J-3 (WAM P26717-033), 7 specimens, 205-510 mm TL. J-5 (WAM P26718-006), 1 specimen, 150 mm TL. This species is known from eastern Australia (Tasmania to Cape York), Lord Howe Island, and New Caledonia.

Family Osteoglossidae—Bony Tongues

Scleropages jardini (Kent)

Osteoglossum jardinii Kent, 1892: 105 (Batavia River, Cape York, Queensland).

J-3 (WAM P26717-002), 2 specimens, 242 and 250 mm SL. This primitive teleost was first described from the Wenlock River (formerly Batavia River) which lies approximately 120 km south of the Jardine River. It is also known from Arnhem Land (Northern Territory) and the central portion of southern New Guinea.

Family Ariidae—Fork-tail Catfishes

Arius australis Günther

Arius australis Gunther, 1867a: 103 (Hunter River, N.S.W.).

One individual, approximately 30 cm was observed by the senior author in 1978 while swimming with a face mask in the main river channel. Widely distributed in northern Australian freshwater and estuaries.

Family Plotosidae—Eel-tail Catfishes

Porochilus obbesi Weber

Porochilus obbesi Weber, 1913: 523 (Lorentz River, New Guinea).

J-2 (WAM P26381-011), 5 specimens, 55-60 mm SL. J-3 (WAM P26717-011), 14 specimens, 45-85 mm SL. J-5 (WAM P26718-001), 6 specimens, 58-66 mm SL. This species is also known from Arnhem Land and the Fly and Lorentz Rivers of southern New Guinea.

Porochilus rendahli (Whitley)

Copidoglanis obscurus (non Gunther) Rendahl, 1922: 173 (Glencoe and Hermit Hill, Northern Territory).

Copidoglanis rendahli Whitley, 1928: 214 (substitute name for *Copidoglanis obscurus* Rendahl).

J-3 (AMS I.21237-006), 1 specimen, 86 mm SL. Feinberg and Nelson, who are revising the freshwater Plotosidae, include this species in the genus *Porochilus*. It is also known from the Kimberley region of Western Australia and the Northern Territory (primarily Arnhem Land).

Tandanus ater (Perugia)

Lambertia atra Perugia, 1894: 551 (Inawi, Papua).

J-3 (WAM P26717-014), 5 specimens, 77-300 mm SL. This species is also known from the Kimberley region of Western Australia, Northern Territory (primarily Arnhem Land), and the central portion of southern New Guinea.

Tandanus brevidorsalis (Günther)

Copidoglanis brevidorsalis Gunther, 1867b: 66 (Cape York, Queensland).

J-3 (WAM P26717-015), 1 specimen, 60 mm SL. Several specimens also collected in 1979 from McDonnell Creek, a tributary of the Jackson River system, approximately 45 km south of the Jardine River. This species is also known from the central portion of southern New Guinea.

Family Belonidae—Long Toms

Strongylura kreffti (Günther)

Belone kreffti Gunther, 1866: 250 (Australia).

GW-1 (AMS un-registered), 1 specimen, 404 mm SL. Several individuals were also observed by the senior author in 1978 while swimming with a face mask in the main river channel. Known from freshwater streams of northern Australia and New Guinea.

Family Atherinidae—Hardyheads

Craterocephalus randi Nichols and Raven

Craterocephalus randi Nichols and Raven, 1934: 3 (Kubuna, New Guinea).

J-3 (WAM P26717-018), 6 specimens, 19-41 mm SL. Ivantsoff (1978) reviewed the Australian and New Guinean species of *Craterocephalus*. He considered *C. randi* of southern New Guinea to be closely related to *C. stercusmuscarum* (Günther) of Queensland and the Northern Territory. He separated these species mainly on the basis of average number of gill rakers on the first arch, midlateral scales, and interdorsal scales. However, the range of counts for these characters are overlapping between the species and the differences are not convincing. We base our identification of this species on a comparison with 29 specimens, 33-52 mm SL of *C. randi* from the Morehead River of southern Papua New Guinea (WAM P26779-001). There are significant colour pattern differences between *C. stercusmuscarum* and *C. randi:* the former species has large dark spots, one per scale, covering most of the side, whereas *C. randi* has a broad, black midlateral stripe extending from the eye to the caudal fin base. This species also occurs in Arnhem Land (Northern Territory) and was first reported from there by Taylor (1964) as *C. fluviatilis* (non McCulloch). We have also collected specimens from the Jackson River system, about 45 km south of the Jardine River.

Family Melanotaeniidae—Rainbowfishes

Iriatherina werneri Meinken (Fig. 2)

Iriatherina werneri Meinken, 1974: un-numbered (near Merauke, Irian Jaya).

J-2 (WAM P26381-001), 6 specimens, 18-21 mm SL. J-2 (AMS I-20585-001), 3 specimens, 14-17 mm SL. J-3 (WAM P26717-001), 76 specimens, 14-21 mm SL. J-3 (AMS I.21237-001), 37 specimens,

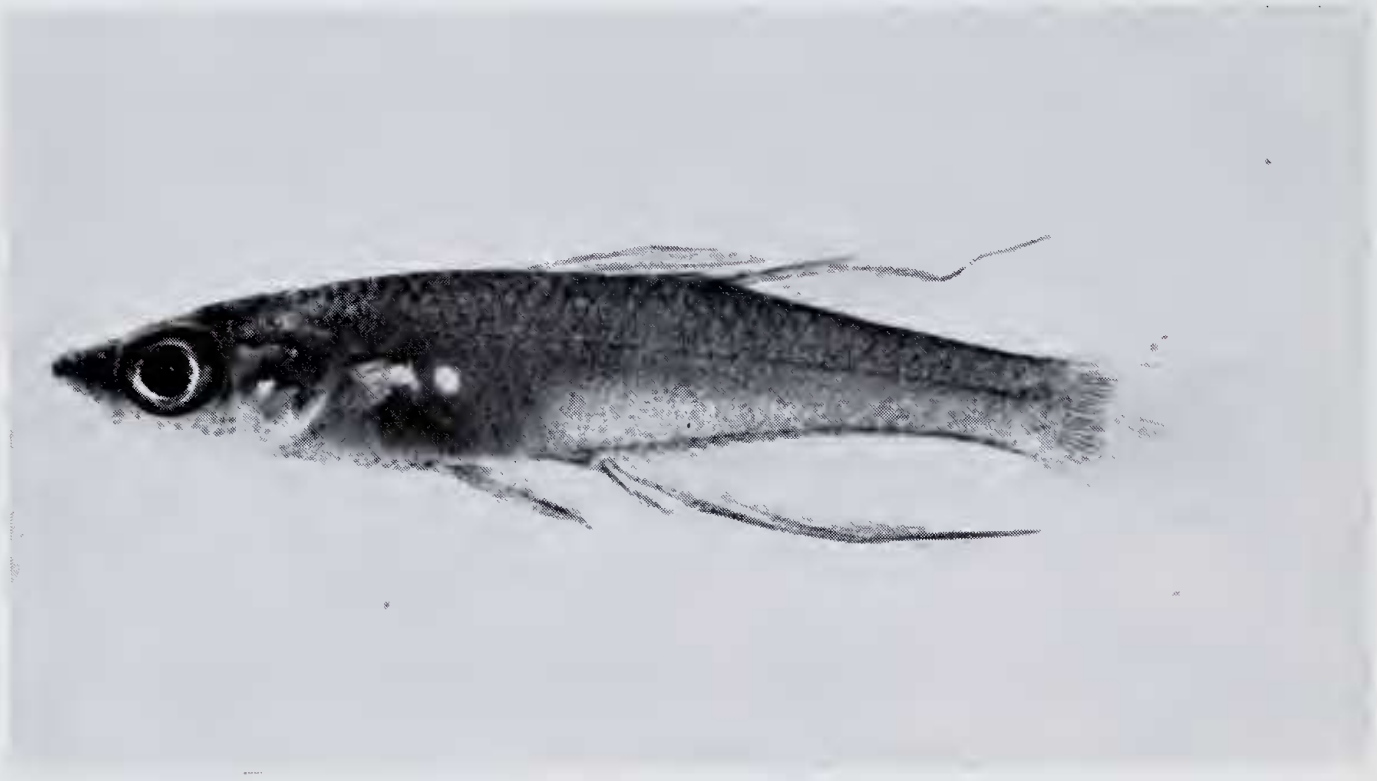

Figure 2.—*Iriatherina werneri*, 19.1 mm SL, Jardine River.

13-24 mm SL. J-5 (WAM P26718-008), 5 specimens, 16-22 mm SL. J-5 (AMS I.21240-004), 10 specimens, 9-17 mm SL. We observed *I.wernei* at J-3 with the aid of a face mask. The fish were very abundant at this locality and other areas along the main river where there was an abundance of water-lily plants. Both pairs and aggregations of 20 or more individuals were encountered among plants near the surface. Most adult males which were observed underwater or viewed after being freshly collected, had very elongate dorsal and anal filaments (Fig. 2). However, these appendages are not evident on most preserved specimens as they are fragile and easily broken.

The monotypic *Iriatherina werneri* was described by Meinken (1974) on the basis of two specimens collected at Merauke (see map, Fig. 1) on the southern coast of New Guinea (Irian Jaya). Although Meinken gave an adequate description of the species he gave no indication of the familial classification for *Iriatherina*. He simply mentioned that it was similar to *Telmatherina*, but differed greatly in head shape. *Telmatherina*, containing 3 lake-dwelling species from the Celebes, is considered a member of the family Atherinidae (Weber and de Beaufort 1922). The overall morphology, particularly the structure of the jaws, and shape of the head, body, and fins does not support a close relationship between *Telmatherina* and *Iriatherina*. A recent study by the senior author (Allen, in press) indicates that the latter genus is a member of the Melanotaeniidae.

We have examined all the known specimens of *I. werneri* except for the types including the following lots: USNM 217156, 30 specimens, 20-32 mm SL (Lake Boset and Middle Fly River, Papua New Guinea); WAM P26749-001, 3 specimens, 25-31 mm SL (Morehead River, Papua New Guinea); WAM P26765-001, 7 specimens, 23-31 mm SL (Pahoturi River, Papua New Guinea). Thus, its known distribution includes the Jardine River and the central portion of southern New Guinea between the Merauke and Fly Rivers. The specimens reported above constitute a new record for Australia.

Melanotaenia maccullochi Ogilby

Melanotaenia maccullochi Ogilby, 1915: 118 (Barron River, Queensland).

J-2 (WAM P26381-004), 1 specimen, 22 mm SL. J-3 (WAM P26717-019), 3 specimens, 18-20 mm SL. B-1 (WAM P26719-005), 21 specimens, 21-29 mm SL. This species appears to be relatively rare in the Jardine River system and only small juveniles have been collected. It also occurs on the coastal plain between Cairns and Cardwell, northern Queensland, the McIvor River, about 60 km north of Cooktown, and southern Papua New Guinea between the Bensbach and Fly Rivers.

Melanotaenia nigrans (Richardson)

Atherina nigrans Richardson, 1843: 180 (near Darwin).

J-1 (WAM P26377-002), 5 specimens, 23-37 mm SL. J-2 (WAM P26381-005), 15 specimens, 18-43 mm SL. J-3 (WAM P26717-008), 39 specimens, 15-40 mm SL. B-1 (WAM P26719-006), 7 specimens, 17-32 mm SL. This species was relatively abundant in small swampy tributaries of the Jardine, but was not seen in the main river. Known in Australia from the Northern Territory in coastal streams between Darwin and Groote Eylandt, and from the tip of Cape York Peninsula north of the Jardine

River. It also occurs at Prince of Wales Island in the Torres Strait. Records of this species from New Guinea are referrable to *M. goldiei* (Macleay).

Melanotaenia splendida (Peters)

Nematocentris splendida Peters, 1867: 516 (Fitzroy River, Queensland).

J-1 (WAM P26377-001), 1 specimen, 70 mm SL. J-2 (WAM P26381-007), 19 specimens, 28-75 mm SL. J-3 (WAM P26717-010), 7 specimens, 27-49 mm SL. J-5 (WAM P26718-009), 7 specimens, 20-34 mm SL. This species was abundant in tributaries and along the edge of the main river channel. The Jardine River variety is similar to that found from Darwin eastward and throughout the Gulf of Carpentaria drainage. It has previously been referred to as a distinct species, *M. maculata,* but a revision of the Australian Melanotaeniidae currently in progress by the senior author indicates that *australis* (Western Australia), *solata* (Northern Territory), *tatei* (Lake Eyre drainage), *maculata,* and *splendida* (coastal Queensland) are merely varieties of the latter species. This species also occurs in southern New Guinea between the Merauke and Fly Rivers and at Badu Island, Torres Strait.

Melanotaenia trifasciata (Rendahl)

Rhombosoma trifasciata Rendahl, 1922: 182 (Mary River, Northern Territory).

J-2 (WAM P26381-006), 15 specimens, 42-68 mm SL. J-3 (WAM P26717-009), 3 specimens, 44-70 mm SL. This species was abundant in tributaries and along the edge of the main river channel. Known from the Mary, Giddy, and Goyder Rivers of northern Territory and the western side of Cape York Peninsula from the Archer River system northwards. It also occurs on the eastern watershed of Cape York Peninsula as far south as the McIvor River about 60 km north of Cooktown. A closely related species, *M. goldiei* (Macleay) is found in southern New Guinea.

Pseudomugil gertrudae Weber

Pseudomugil gertrudae Weber, 1911: 23 (Aru Islands).

J-2 (WAM P26381-003), 11 specimens, 14-17 mm SL. J-3 (WAM P26717-021), 50 specimens, 12-23 mm SL. J-5 (WAM P26718-007), 1 specimen, 15 mm SL. B-1 (WAM P26719-004), 12 specimens, 17-21 mm SL. B-1 (WAM P26716-001), 22 specimens, 13-19 mm SL. Specimens from the Jardine River agree well with those reported from Groote Eylandt by Taylor (1964). However, there is some doubt as to whether Australian specimens are conspecific with the species originally described by Weber from the Aru Islands. There is a critical need for revision of the subfamily Pseudomugilinae. This group has been frequently placed in the Atherinidae or accorded separate family status, but Allen (in press) provides evidence which indicates a relationship with the Melanotaeniidae. *P. gertrudae* is known in Australia from Arnhem Land, Groote Eylandt, the Jardine River, and the coastal plain between Cardwell and Cairns in Queensland. Roberts (1978) also recorded it from the Fly River drainage of southern New Guinea.

Family Synbranchidae—Swamp Eels

Ophisternon gutturale (Richardson)

Synbranchus gutturalis Richardson, 1844 (Dampier Archipelago, Western Australia).

J-3 (WAM P26717-016), 3 specimens, 146-160 mm TL. We follow Rosen and Greenwood (1976) in using the name *gutturale* for this species. It is closely related to *O. bengalense* M'Clelland from the Indo-Malayan region. It is possible that records (see Munro 1958) of the latter species from New Guinea are actually referrable to *O. gutturale.* Also known from Arnhem Land (Northern Territory). The type locality of Dampier Archipelago is questionable because this area is composed of desert islands without permanent freshwater. However, it is possible that the type specimen was collected from the mainland opposite the Dampier Archipelago, although this species has not been taken there on WAM collecting expeditions.

Family Centropomidae—Barramundi

Lates calcarifer (Bloch)

Holocentrus calcarifer Bloch, 1790: 100 (Japan).

One individual, approximately 500 mm SL, was observed by the senior author in 1978 while swimming with a face mask in the main river channel. Widely distributed in estuaries and freshwater streams from the Persian Gulf eastward to southern China and the Indo-Australian Archipelago.

Family Ambassidae—Glassfishes

Ambassis elongatus (Castelnau)

Pseudoambassis elongatus Castelnau, 1878: 44 (Norman River, Queensland).

J-2 (WAM P26381-009), 11 specimens, 22-35 mm SL. J-3 (WAM P26717-017), 6 specimens, 21-31 mm SL. J-5 (WAM P26718-003), 10 specimens, 19-28 mm SL B-1 (WAM P26719-003), 1 specimen, 22 mm SL. This species was relatively common in tributaries and along the edge of the main river. Known only from streams draining into the Gulf of Carpentaria.

Ambassis macleayi (Castelnau)

Pseudoambassis macleayi Castelnau, 1878: 43 (Norman River, Gulf of Carpentaria, Queensland).

J-5 (WAM P26718-012), 2 specimens, 34 and 36 mm SL. This species is relatively widespread in northern Australia, ranging from Cape York Peninsula to the Carson River in Western Australia. It also occurs in the central portion of southern New Guinea.

Denariusa bandata Whitley

Denariusa bandata Whitley, 1948: 92 (Arnhem Land, Northern Territory).

J-2 (WAM P26381-010), 9 specimens, 18-27 mm SL. J-3 (WAM P26717-007), 12 specimens, 13-26 mm SL. J-5 (WAM P26718-002), 2 specimens, 18 and 23 23 mm SL. B-1 (WAM P26719-002), 1 specimen, 29 mm SL. This species was moderately common among aquatic vegetation, particularly in swampy tributaries. Known also from coastal

streams of the Northern Territory east of the Alligator Rivers system to Groote Eylandt and from a single specimen collected from the Murray Swamps near Innisfail on the east Queensland coast by S. H. Midgley (pers. comm.). Roberts (1978) also recorded it from the Fly River system of Papua New Guinea.

Family Apogonidae—Cardinalfishes

Glossamia aprion (Richardson)

Apogon aprion Richardson, 1842: 16 (near Darwin).

J-2 (WAM P26381-012), 5 specimens, 34-62 mm SL. J-3 (WAM P26717-005), 16 specimens, 43-140 mm SL. J-5 (WAM P26718-010), 4 specimens, 30-50 mm SL. This species was frequently observed among shoreline vegetation. Known from coastal streams of northern Australia and southern New Guinea.

Family Teraponidae—Grunters

Hephaestus carbo (Ogilby and McCulloch)

Therapon carbo Ogilby and McCulloch, 1916: 116 (Gregory River, Queensland).

J-2 (WAM 26381-014), 1 specimen, 181 mm SL. J-3 (WAM P26717-004), 4 specimens, 101-195 mm SL. This species was relatively common in the small tributary where collections J-1, J-2, and J-3 were made. Vari (1978) recognised *H. suavis* Whitley, known on the basis of two specimens, 51 and 65 mm SL from Cape York Peninsula, as a distinct species. However, it is our opinion that *H. suavis* represents the young of *H. carbo*. The adults which were collected agree in preserved colouration with *H. carbo* as illustrated by Vari, while young specimens (under about 100 mm SL) exhibited the typical *suavis* pattern of irregular pale stripes on a dark ground. Known from the Goyder River of Arnhem Land, the Gregory River of Western Queensland (Gulf of Carpentaria drainage), and the Cape York Peninsula north of the Archer River system.

Pingalla lorentzi (Weber)

Helotes lorentzi Weber, 1910: 326 (Lorentz River, New Guinea).

J-2 (WAM P26381-013), 2 specimens, 53 and 75 mm SL. J-3 (WAM P26717-022), 18 specimens, 46-130 mm SL. We provisionally identify this species as *P. lorentzi*, known previously from the central portion of southern New Guinea. The specimens differ from New Guinea material in having 3 to 5 rows of teeth in the jaws instead of 2 rows, and in having the mouth terminating below the posterior nostril instead of between the anterior and posterior nostrils. One of the juvenile specimens has a single vomerine tooth. We also collected this species in Cockatoo Creek, a tributary of the Jackson River about 45-50 km south of the Jardine River. A new record for Australia. A related species, *Pingalla gilberti*, is known from the Gilbert, Flinders, and Norman Rivers of Queensland and the South Alligator River in the Northern Territory.

Family Toxotidae—Archerfishes

Toxotes chatareus (Hamilton)

Coius chatareus Hamilton, 1822: 101 and 370 (Ganges River, India).

Several individuals were observed along the edge of the main river channel. Known from estuaries and freshwater streams of Southeast Asia (India to China), Malaysia, Indonesia, and New Guinea. In Australia it is found in northern coastal streams from the Fitzroy River of Western Australia to the vicinity of Townsville. Breeding populations are sometimes encountered more than 100 km upstream from the sea (Allen 1978).

Family Gobiidae—Gobies

Glossogobius sp.

J-2 (WAM P26381-019), 2 specimens, 24 and 25 mm SL. J-3 (AMS I.21237-002), 6 specimens, 10-27 mm SL. J-4 (AMS I.21238-001), 16 specimens, 12-21 mm SL. J-5 (AMS I.21241-001), 17 specimens, 11-24 mm SL. J-5 (WAM P26718-004), 2 specimens, 18 and 25 mm SL. J-6 (AMS I.21240-001), 13 specimens, 10-27 mm SL. Dorsal rays VI-I,8; anal rays I,6-7; pectoral rays 14-15; vertical scale rows 24-26. The midline of the nape is naked, but the sides scaled to above the operculum. There are no head pores above the operculum. The jaws end under the anterior margin of the eye. The gill opening ends below and behind the posterior preopercular margin. The tongue is bilobed. There is a distinct black spot at the posterior end of the first dorsal fin. The dorsals have small spots forming two to four rows, and the caudal has similar spots forming wavy bands. The anal, pectoral, and pelvic fins are clear to dusky. There is a black stripe on the side of the body formed by a series of elongate spots. There is a black stripe from the front of the eye to below the anterior nostril.

This species, which is possibly new, is distinctive from other species of *Glossogobius* in colouration, the absence of pores above the operculum, in the low fin ray and scale counts, and the absence of scales on the midline of the nape. The species is known from creeks and rivers of the Gulf of Carpentaria drainage system on Cape York Peninsula between the Jardine and Archer River systems.

Family Eleotridae—Gudgeons

Hypseleotris compressa (Krefft)

Eleotris mogurnda Richardson, 1844: 4 (vicinity of Darwin). Denison, Australia).

J-2 (WAM P26381-015), 2 specimens, 38 and 41 mm SL. J-3 (WAM P26717-012), 1 specimen, 53 mm SL. This species is widely distributed in northern and eastern Australia and also occurs in southern New Guinea.

Mogurnda mogurnda (Richardson)

Eleotris mogurnda Richardson, 1844: 4 vicinity of Darwin).

J-2 (WAM P26381-017), 2 specimens, 18 and 38 mm SL. J-3 (WAM P26717-013), 3 specimens, 21 33 mm SL. B-1 (WAM P26719-001), 3 specimens, 26-47 mm SL. This is another widespread eleotrid species occurring in coastal streams of northern Australia and southern New Guinea.

Oxyeleotris sp. A

J-2 (WAM P26381-016), 2 specimens, 38 and 51 mm SL. J-3 (AMS I.21237-001), 3 specimens, 60-73 mm SL. Dorsal rays VI-I,12; anal rays I,10; pectoral rays 14-15; vertical scale rows 53-55. The head pores are large and conspicuous; there is a pair of pores adjacent to each posterior nostril; there are two pairs of interorbital pores. There are 6-7 short stubby rakers on the lower part of the first gill arch. The colouration is dark brown to black; there is no conspicuous black bar before the eye. The second dorsal and caudal fins are spotted, but the other fins dusky. There is no white margin around the caudal fin. The tip of the anal fin is lighter than the rest of the fin. There is a faint black spot, about equal to pupil in size, at the upper base of the caudal fin.

A closely related species, occurs in the Jackson River Drainage about 40-50 km south of the Jardine River. It differs in having large head pores, with only a single pore near each posterior nostril and a single median posterior interorbital pore. It also has one fewer dorsal and anal rays, and has the back much lighter than the sides. Both species are similar to *O. fimbriatus,* but as Roberts (1978) noted, there are at least 2 species, which have been confused under the name *O. fimbriatus.* A re-examination of the types of *Eleotris fimbriatus* Weber, *E. mertoni* Weber, and *E. auruensis* Weber is necessary to clarify the identity of the Australian species.

Oxyeleotris sp. B

J-2 (WAM P26381-018), 2 specimens, 17 and 20 mm SL. J-3 (AMS I.21237-003), 152 specimens, 13-31 mm SL. J-3 (WAM P26717-020), 17 specimens, 15-27 mm SL. J-4 (AMS I.21238-002), 7 specimens, 17-27 mm SL. J-5 (AMS I.21240-003), 14 specimens, 11-26 mm SL. J-5 (WAM P26718-005), 1 specimen, 26 mm SL. J-6 (AMS I.21239-001), 23 specimens, 15-26 mm SL. J-7 (AMS I.21241-003), 75 specimens, 16-30 mm SL. B-1 (AMS I.21236-002), 2 specimens, 21 and 25 mm SL. Dorsal rays VI-I,10-11; anal rays I,7-9; pectoral rays 11-12; segmented caudal rays 17; branched caudal rays 13; vertical scale rows 30-37; rakers on lower part of first arch 8-9. The preserved colouration is overall dusky, paler ventrally with a vertical blotch below and a similar blotch above at the base of the caudal fin. The dorsal fins have small spots forming longitudinal stripes. The caudal has small spots forming wavy bands. There is a dark spot, with a white centre above the pectoral base. In some specimens there are irregular blotches on the body forming chevrons. There are 3 dark bands radiating posteriorly from the eye, but these are obscure in dark specimens.

This species is also known from Arnhem Land and creeks north of Jardine River. It is possibly identical with *O. nullipora* Roberts from New Guinea. However, New Guinea material apparently lacks spots on the caudal fin. The small mouth and low scale counts of these species and *O. paucipora* are distinctive from other species of *Oxyeleotris,* and further studies are necessary to clarify the generic relationships of this group.

Table 1

Summary of the fishes of the Jardine River

Family	Species
Megalopidae	**Megalops cyprinoides*
Anguillidae	*Anguilla reinhardti*
Osteoglossidae	**Scleropages jardini*
Ariidae	*Arius australis*
Plotosidae	**Porochilus obbesi*
Plotosidae	*P. rendahli*
Plotosidae	**Tandanus ater*
Plotosidae	**T. brevidorsalis*
Belonidae	**Strongylura kreffti*
Atherinidae	**Craterocephalus randi*
Melanotaeniidae	**Iriatherina werneri*
Melanotaeniidae	**Melanotaenia maccullochi*
Melanotaeniidae	*M. nigrans*
Melanotaeniidae	**M. splendida*
Melanotaeniidae	*M. trifasciata*
Melanotaeniidae	**Pseudomugil gertrudae*
Synbranchidae	*Ophisternon gutturale*
Centropomidae	**Lates calcarifer*
Ambassidae	*Ambassis elongatus*
Ambassidae	**A. macleayi*
Ambassidae	**Denariusa bandata*
Apogonidae	**Glossamia aprion*
Teraponidae	*Hephaestus carbo*
Teraponidae	**Pingalla lorentzi*
Toxotidae	**Toxotes chatareus*
Gobiidae	*Glossogobius sp.*
Eleotridae	**Hypseleotris compressa*
Eleotridae	**Mogurnda mogurnda*
Eleotridae	*Oxyeleotris sp. A*
Eleotridae	*Oxyeleotris sp. B*

*denotes also recorded from southern New Guinea.

Discussion

The known fish fauna of the Jardine River is summarised in Table 1. Undoubtedly further collecting efforts will add several other fishes to the list. Such species as the freshwater sawfish (*Pristis*), the mangrove jack (*Lutjanus argentimaculatus*), mullet (Mugilidae), and freshwater soles (Soleidae) were not recorded during the present survey, but most likely inhabit this stream.

The Jardine River area lies approximately 205 km south of New Guinea. The two areas are separated primarily by the shallow (average depth about 13 m) waters of Torres Strait. However, this separation is of relatively recent origin (geologically speaking), most likely having existed continuously for only the past 6500-8000 years. Prior to this time the two regions were usually connected by a land bridge which existed for at least 200 million years (see Walker 1972). The Torres Strait is so shallow that it would have been land during the time of Pleistocene low sea levels, for periods totalling perhaps 500 000 years (see map, Fig. 1). Thus, it is not surprising that the fish fauna of the Jardine River bears a strong resemblance to that of the coastal lowlands of southern New Guinea opposite Torres Strait. At least 63% of the Jardine River species (Table 1) are found in New Guinea and this figure will probably be increased with further collections in both areas and clarification of taxonomic problems (particularly in the Ariidae, Synbranchidae, Ambassidae, Gobiidae, and Eleotridae). A similar relationship between the frog fauna of Cape York Peninsula and southern New Guinea was noted by Tyler (*in* Walker 1972). Munro (1964) listed 24 fish species (excluding those occurring in brackish water) common to northern Australia and New Guinea. However, current studies by the senior author indicate that 2 of the melanotaeniids (*Melanotaenia goldiei* and *M. ogilbyi*) included in this category are not found in Australia, and a third melanotaeniid,

M. nigrans, does not occur in New Guinea. Similarly, Vari (1978) has shown that *Hephaestus romeri*, a teraponid listed by Munro, is confined to southern New Guinea.

Another major facet of the Jardine fish fauna, and one which has previously been overlooked, or at least misinterpreted is a relationship between this region (i.e., northern tip of Cape York Peninsula) and the northernmost section of the Northern Territory, particularly Arnhem Land (Fig. 1). Previous workers have frequently assumed that fishes occurring in these 2 regions have continuous distributions, occurring throughout the Gulf of Carpentaria drainage. However, on the basis of museum records and a series of collections by the senior author between the Gregory and Mitchell Rivers (Fig. 1), we are convinced that certain species common to Cape York and Northern Territory exhibit disjunct distributions. Species which fall in this category include *Porochius obbesi, P. rendahli, Tandanus ater, Melanotaenia nigrans, M. trifasciata, Pseudomugil gertrudae, Craterocephalus randi, Denariusa bandata, Ambassis elongatus, Oxyeleotris* sp. B, and possibly *Ophisternon gutturale*. In addition, *Scleropages jardini* and *Hephaestus carbo* are absent from the portion of the gulf drainage between the Gregory and Mitchell Rivers (Fig. 1).

The reason for these distributional discontinuities is probably related to the inundation of the Gulf of Carpentaria basin during the Pleistocene and associated temperature regimes during that period. There is good evidence (see Nix and Kalma *in* Walker 1972) that the connecting land mass between Australia and New Guinea was very broad for perhaps 3000-6000 years during the late Pleistocene (about 20 000-14 000 years B.P.) and covered the area now occupied by the Torres Strait, Gulf of Carpentaria, and the easternmost portion of the Arafura Sea (Fig. 1). It is not difficult to imagine that the freshwater fish fauna inhabiting the swamps and streams of this now inundated land was very similar in composition to the present day fauna. From what is known about evolutionary rates of fishes it would be safe to say that many if not all of the species which presently occur in the Jardine River were extant during the last stages of the Pleistocene. It seems likely that a more or less continuous fauna may have occurred across this region north of approximately 15° south latitude. The southward distributions of many of the species was probably limited by cooler temperature regimes. Recent data (Table 2) indicates a marked temperature gradient during late winter ranging from 27-32° C in the Northern Territory and northern portion of Cape York Peninsula to 22-23° C in streams running into the lower portion of the Gulf of Carpentaria. Certainly this same sort of gradient existed at the time of the Gulf of Carpentaria-Arafura land bridge during the late Pleistocene and it was probably of greater magnitude because of the more inland position of the major river systems flowing through the southern half of what is now the Gulf of Carpentaria. Nix and Kalma (*in* Walker 1972) estimate that present-day temperature regimes were probably lowered by 3-4 C° at sea level during Pleistocene times. Their data is based on a 5-6 C° reduction necessary to account for the lowering of the New Guinea snowline which occurred during the Pleistocene, and corresponds with a 3-9 C° reduction in global mean temperatures postulated by Flint and Brandtner (1961). Thus a lowering of minimum temperatures to at least 18-19° C in the lower Gulf area probably prevented the southward dispersal of some fishes. Temperatures were probably even lower in these areas as cooler, drier air masses appeared to have dominated northern Australia at the time of maximum lowering of the sea during Pleistocene glaciations (Webser and Stratnen *in* Walker 1972). Minimum winter temperatures may have been similar to the 13°C recorded by S. H. Midgley (pers. comm.) in July 1971 in the Georgina River at Camooweal, Queensland (19°55′S, 138°07′E).

Table 2

Temperature data for northern Australian streams

Locality	Date	Temperature (°C)
Jardine River (11°10′S, 142°22′E)	21 Sept. 1978	28
Wenlock River (12°27′S, 142°33′E)	22 Sept. 1978	29
Archer River (13°26′S, 142°57′E)	18 Sept. 1978	27
Mitchell River (16°32′S, 143°36′E)	12 Sept. 1978	26
Staaten River (16°25′S, 142°02′E)	12 Sept. 1978	27
Einsleigh River (18°10′S, 144°00′E)	6 Sept. 1978	25
Gilbert River (18°26′S, 142°43′E)	7 Sept. 1978	24
Norman River (18°05′S, 141°15′E)	7 Sept. 1978	23
Leichardt River (18°07′S, 139°53′E)	9 Sept. 1978	23
Gregory River (18°38′S, 139°15′E)	9 Sept. 1978	22
East Alligator River System (12°30′S, 133°30′E)	Sept.-Oct. 1972	26-32

Another pattern of disjunction is evident in 3 of the Jardine River fishes, *Melanotaenia maccullochi, Pseudomugil gertrudae,* and *Denariusa bandata.* Although additional collections are needed on the eastern coast of Cape York Peninsula there appears to be a genuine gap in the distributions of these species, roughly extending along the Pacific coast between Cairns and the vicinity of the Jardine River, although *M. maccullochi* was recently taken by the junior author near Cooktown. Possible relict populations of these species are found in a relatively narrow coastal belt between Cardwell and Cairns. It is difficult to account for this pattern of discontinuity, although post-glacial flooding of coastal plain habitat and climatic changes may have been contributing factors.

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